Agency for Healthcare Research and Quality
Advancing Excellence in Health Care

NATIONAL GUIDELINE CLEARINGHOUSE

General

Guideline Title

The implementation of targeted temperature management: an evidence-based guideline from the Neurocritical Care Society.

Bibliographic Source(s)

Madden LK, Hill M, May TL, Human T, Guanci MM, Jacobi J, Moreda MV, Badjatia N. The implementation of targeted temperature management: an evidence-based guideline from the Neurocritical Care Society. Neurocrit Care. 2017 Dec;27(3):468-87. [205 references] PubMed

Guideline Status

This is the current release of the guideline.

This guideline meets NGC's 2013 (revised) inclusion criteria.

NEATS Assessment

National Guideline Clearinghouse (NGC) has assessed this guideline's adherence to standards of trustworthiness, derived from the Institute of Medicine's report Clinical Practice Guidelines We Can Trust.

= Poor = Fair = Good = Very Good = Excellent

Assessment	Standard of Trustworthiness
YES	Disclosure of Guideline Funding Source
	Disclosure and Management of Financial Conflict of Interests
	Guideline Development Group Composition
YES	Multidisciplinary Group
YES	Methodologist Involvement

▮▯▯▯▯	Patient and Public Perspectives
	Use of a Systematic Review of Evidence
▮▮▮▮▮	Search Strategy
▮▮▮▯▯	Study Selection
▮▮▮▮▮	Synthesis of Evidence
	Evidence Foundations for and Rating Strength of Recommendations
▮▮▮▮▯	Grading the Quality or Strength of Evidence
▮▮▮▮▮	Benefits and Harms of Recommendations
▮▮▮▮▮	Evidence Summary Supporting Recommendations
▮▮▮▮▯	Rating the Strength of Recommendations
▮▮▮▮▮	Specific and Unambiguous Articulation of Recommendations
▮▮▯▯▯	External Review
▮▯▯▯▯	Updating

Recommendations

Major Recommendations

Definitions of the strength of recommendations (*strong, conditional, good practice*) and quality of the evidence (*high, moderate, low, very low*) are provided at the end of the "Major Recommendations" field.

Induction and Maintenance of Targeted Temperature Management (TTM)

Does a Pre-defined Duration of TTM Result in Similar Outcomes as Goal-Directed Therapy?

Recommendations

The Committee suggests at least 24 h of cooling in out-of-hospital cardiac arrest (OHCA) patients. (*Conditional recommendation, moderate quality evidence*)

The Committee suggests longer duration TTM for severe traumatic brain injury (TBI) patients should intracranial pressure (ICP) control be the goal. (*Conditional recommendation, low-quality evidence*)

The Committee advises against longer (>72 h) or deeper (<32.0 °C) hypothermia in neonates with hypoxic-ischemic encephalopathy (HIE). (*Conditional recommendation, moderate-quality evidence*)

See Evidentiary Table 1 (see the "Availability of Companion Documents" field for all evidentiary tables).

Does Prophylactic Initiation of TTM Result in Similar Outcomes as Symptom-Based Initiation?

Recommendations

The Committee cannot recommend any specific timing of TTM initiation (prophylactic or symptom-based), due to equivocal evidence about its impact on length of stay, ICP burden, and neurologic outcome.

The Committee recommends using controlled normothermia to reduce fever burden in patients with fever refractory to conventional therapy. (*Strong recommendation, moderate-quality evidence*)

See Evidentiary Table 2.

In Neurocritical Care Patients, Which Method of TTM Achieves Fastest Time to Target?

Recommendations

The Committee recommends using intranasal, surface, or intravascular temperature-modulating devices and/or cold saline infusions over air cooling blankets, cooling fans, or cooling packs to achieve faster time to target temperature, improve the likelihood of achieving target temperature, and lessen the likelihood of overshoot. (*Strong recommendation, high-quality evidence*)

The Committee recommends using surface cooling devices over passive air cooling and/or ice packs to increase the likelihood of achieving target temperature in neonatal patients with hypoxic-ischemic encephalopathy. (*Strong recommendation, high-quality evidence*)

See Evidentiary Table 3.

In Neurocritical Care Patients, Which Method of TTM Causes the Least Temperature Variability?

Recommendations

To maintain constant patient temperature, the Committee recommends using intravascular catheters, or gel pads if such catheters are not available. (*Strong recommendation, high-quality evidence*)

To minimize temperature variability in neonates with HIE, the Committee suggests using a servo-controlled body wrap over conventional measures. (*Conditional recommendation, low-quality evidence*)

To minimize overshoot, the Committee recommends gel pads over conventional measures. (*Strong recommendation, moderate-quality evidence*)

To minimize overshoot, the Committee suggests using temperature modulating devices with servo-controls and gradient temperature changes. (*Conditional recommendation, low-quality evidence*)

See Evidentiary Table 4.

In Neurocritical Care Patients Undergoing TTM, What Is the Optimal Temperature Measurement Site?

Recommendations

The Committee suggests using an esophageal temperature probe during all phases of TTM. If an esophageal probe is not appropriate or available, they suggest using a bladder temperature probe. (*Conditional recommendation, low-quality evidence*)

Clinicians should monitor temperature continuously during TTM. (*Good practice statement*)

See Evidentiary Table 5.

Shivering

In Neurocritical Care Patients Undergoing TTM, Should Shivering Be Assessed Using Standardized Tools?

Recommendations

Clinicians and researchers should consider using a shivering assessment tool. (*Good practice statement*)

Of the tools available, the committee recommends the Bedside Shiver Assessment Scale (BSAS) because of its established accuracy and inter-rater reliability. (*Strong recommendation, moderate quality*

evidence)

See Evidentiary Table 6.

In Neurocritical Care Patients Undergoing TTM, Does Treatment of Shivering Result in Similar Functional Outcomes as Compared to No Treatment?

Good Practice Statements

Clinicians should treat shivering promptly.

The Committee suggests a stepwise approach to shivering which prioritizes non-sedating interventions (acetaminophen, counterwarming, magnesium) over narcotic analgesics, sedatives, or paralytics.

See Evidentiary Table 7.

In Neurocritical Care Patients Undergoing TTM, Is Metabolic Demand Similar to Patients Not Undergoing TTM?

Good Practice Statement

Clinicians should be aware of the impact that TTM may have upon metabolism and substrate utilization. Metabolic support should be driven by the disease state and actual measurement of metabolism.

See Evidentiary Table 8.

Complications

In Neurocritical Care Patients, What Is the Impact of TTM on GI Complications?

Recommendation

The Committee suggests that no additional measures be considered to avoid gastric intolerance in patients undergoing TTM. (*Conditional recommendation, low-quality evidence*)

See Evidentiary Table 9.

In Neurocritical Care Patients Undergoing TTM, Should Clinicians Be More Vigilant for Infection and/or Interpret Laboratory Markers of Infection Differently?

Recommendation

The Committee suggests that clinicians adhere to standard critical care guidelines when monitoring for infection in patients undergoing TTM. (*Conditional recommendation, low-quality evidence*)

See Evidentiary Tables 10a and 10b.

Are Laboratory Parameters Altered in Neurocritical Care Patients Receiving TTM?

Recommendations

The Committee recommends maintaining serum potassium levels between 3.0 and 3.5 mmol/L during induction and maintenance phases to prevent rebound hyperkalemia and arrhythmias during rewarming. (*Strong recommendation, high-quality evidence*)

Arterial blood gas measurements should be temperature-corrected. (*Good practice statement*)

Clinical monitoring for other laboratory abnormalities during cooling should be similar to that for any critically ill patient. (*Good practice statement*)

See Evidentiary Table 11.

In Neurocritical Care Patients, Does TTM Affect the Pharmacokinetics and Pharmacodynamics of Medications?

Good Practice Statements

As with standard intensive care practice, clinicians should monitor the therapeutic efficacy of drugs and measure serum concentrations where possible.

Given that the pharmacokinetics of commonly used analgesics and sedatives may be altered by cooling, clinicians should consider their potentially long-lasting impact on neurologic assessments during TTM.

See Evidentiary Table 12.

In Neurocritical Care Patients, Does TTM Affect the Incidence of Bleeding?

Recommendations

The Committee strongly recommends no change in routine care with respect to monitoring for bleeding and preventing thrombosis in TTM patients. (*Strong recommendation, high-quality evidence*)

The Committee suggests that thromboelastometry may be helpful in measuring coagulation and platelet aggregation in TTM patients. (*Conditional recommendation, low-quality evidence*)

See Evidentiary Table 13.

In Neurocritical Care Patients Does TTM Affect Early Mobilization?

Good Practice Statement

Clinicians should consider daily mobilization for all TTM patients.

Do Patients Undergoing TTM Require Special Care to Prevent Skin Complications?

Recommendation

The Committee suggests increased vigilance for skin breakdown when using surface cooling devices in patients with shock or left ventricular failure. (*Conditional recommendation, low-quality evidence*)

See Evidentiary Table 14.

In Neurocritical Care Patients Undergoing TTM, Is There a Greater Incidence of Cardiac and/ or Thrombotic Complications?

Recommendations

The Committee recommends cardiac monitoring during TTM, particularly during hypothermia. (*Strong recommendation, high-quality evidence*)

Because of the lack of evidence for increased risk, the Committee does not recommend a change to routine monitoring for other complications, including renal failure, acute respiratory distress syndrome (ARDS), gastrointestinal (GI)-tract impairment, hypotension, deep vein thrombosis (DVT), days intubated and seizures. (*Strong recommendation, high-quality evidence*)

See Evidentiary Table 15.

Definitions

Grading of Recommendations Assessment, Development and Evaluation (GRADE) Criteria for Quality of Evidence

Quality of Evidence	Description
High	Further research is very unlikely to change confidence in the estimate of effect.
Moderate	Further research is likely to have an important impact on confidence in the estimate of effect and may change the estimate.

Quality of Evidence	Description
Low	Further research is very likely to have an important impact on confidence in the estimate of effect and is likely to change the estimate.
Very Low	Any estimate of effect is very uncertain.

Strength of Recommendation

Strength of Recommendation	Description
Strong	Most patients should receive the intervention.
Conditional	Most patients would benefit from the intervention, though some may not. The pros and cons of the intervention should be assessed taking into account the available evidence and the values and preferences of the patient.
Good Practice	There is a high confidence in the estimates of the effect of the intervention, but there is only indirect evidence that would be challenging to subject to a formalized Grading of Recommendations Assessment, Development and Evaluation (GRADE) evaluation.

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Neurologic injury resulting from:

- Neonatal hypoxic-ischemic encephalopathy (HIE)
- Out-of-hospital cardiac arrest (OHCA)
- Ischemic stroke
- Traumatic brain injury (TBI)
- Intracranial hemorrhage

Guideline Category

Management

Treatment

Clinical Specialty

Critical Care

Neurology

Intended Users

Physicians

Guideline Objective(s)

To develop an evidence-based guideline regarding the use of targeted temperature management (TTM) in neurocritical care

Target Population

Patients with neurologic injuries

Interventions and Practices Considered

1. At least 24 h of cooling or longer, as indicated
2. Controlled normothermia
3. Intranasal, surface, or intravascular temperature-modulating devices and/or cold saline infusions
4. Surface cooling devices
5. Intravascular catheters
6. Gel pads
7. Servo-controlled body wrap
8. Temperature modulating devices with servo-controls and gradient temperature changes
9. Esophageal or bladder temperature probes
10. Continuous monitoring during targeted temperature management (TTM)
11. Shivering assessment tool (i.e., Bedside Shiver Assessment Scale [BSAS])
12. Stepwise approach to shivering which prioritizes non-sedating interventions (acetaminophen, counterwarming, magnesium)
13. Metabolic support
14. Adherence to standard critical care guidelines when monitoring for infection
15. Maintaining of serum potassium levels
16. Temperature-correction of arterial blood gas measurements
17. Routine monitoring for bleeding and preventing thrombosis
18. Thromboelastometry
19. Consideration of daily mobilization
20. Increased vigilance for skin breakdown
21. Cardiac monitoring, particularly during hypothermia

Note: The following interventions were considered but not recommended: longer (>72 h) or deeper (<32.0 °C) hypothermia in neonates with hypoxic-ischemic encephalopathy (HIE); specific timing of TTM initiation (prophylactic or symptom-based); change to routine monitoring for other complications, including renal failure, acute respiratory distress syndrome (ARDS), gastrointestinal (GI)-tract impairment, hypotension, deep vein thrombosis (DVT), days intubated and seizures.

Major Outcomes Considered

- Neurologic outcome
- Mortality
- Functional outcomes
- Secondary neurological injury (i.e., intracranial pressure [ICP] burden and/or fever burden)
- Intensive care unit (ICU) length-of-stay
- Time to target temperature
- Degree of temperature variability
- Overshoot of target temperature
- Risk of adverse events (risk of bleeding, risk of infection, risk of cardiac complications)

Methodology

Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Methods

Using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) framework, the Committee generated a set of 16 clinical questions relevant to targeted temperature management (TTM) specifying the patient group of interest, the intervention, the comparators, and the outcomes of interest (Population-Intervention-Comparison-Outcomes [PICO] format). With the assistance of a research librarian, the Committee undertook a comprehensive literature search of the PubMed, CINAHL PLUS, EMBASE, Cochrane Library, and Joanna Briggs Institute Evidence-Based Practice databases with no back date through November 2016. Also included for analysis were articles identified in bibliographies and personal files which included references up to March 2017.

The Committee did not consider articles in languages other than English, non-human studies, or unpublished presentations. The Committee considered systematic reviews, meta-analyses, randomized controlled trials, and observational studies which specifically addressed the PICO variables. Neonatal and pediatric studies were included where applicable. At least two Committee members reviewed the abstracts from the electronic search for relevance, and full-text articles were obtained where applicable. The full search strategy is provided in the supplementary materials (Appendix A [see the "Availability of Companion Documents" field]).

Number of Source Documents

There were 120 studies included in the evidence base.

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Grading of Recommendations Assessment, Development and Evaluation (GRADE) Criteria for Quality of Evidence

Quality of Evidence	Description
High	Further research is very unlikely to change confidence in the estimate of effect.
Moderate	Further research is likely to have an important impact on confidence in the estimate of effect and may change the estimate.
Low	Further research is very likely to have an important impact on confidence in the estimate of effect and is likely to change the estimate.
Very Low	Any estimate of effect is very uncertain.

Methods Used to Analyze the Evidence

Review of Published Meta-Analyses

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

The Committee utilized Grading of Recommendations Assessment, Development and Evaluation (GRADE) methodology to adjudicate the quality of evidence as high, moderate, low, or very low based on their confidence that the estimate of effect approximated the true effect. They generated recommendations only after considering the quality of evidence, relative risks and benefits, patient values and preferences, and resource allocation.

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

Experts in neurocritical care, nursing, and pharmacotherapy were recruited from within the Neurocritical Care Society (NCS) to form a writing Committee, and a preliminary organizational meeting was held in Scottsdale, Arizona in September 2015. Using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) framework, the Committee generated a set of 16 clinical questions relevant to targeted temperature management (TTM) specifying the patient group of interest, the intervention, the comparators, and the outcomes of interest (Population-Intervention-Comparison-Outcomes [PICO] format).

The Committee generated recommendations only after considering the quality of evidence, relative risks and benefits, patient values and preferences, and resource allocation. The Committee formulated recommendations for or against an intervention, and classified them as strong ("The Committee recommends") or conditional ("The Committee suggests"). Strong recommendations are the preferred course of action for most patients and should be adopted as policy in most situations. Conditional recommendations require further consideration within the clinical and institutional context and should be carefully evaluated by stakeholders before being implemented as policy.

In addition to offering recommendations based on the formal GRADE process, the Committee identified areas of practice where there is insufficient evidence to support recommendations and opted to provide "good practice statements" to address these issues. These statements are meant to serve as clinical guidance where there is a high level of certainty regarding overall benefit (or harm), but a lack of published evidence.

The full Committee met on January 10–11, 2017, in Denver and again on March 24–25, 2017, in Boston. Topic authors presented GRADE evidence summaries, and recommendations were arrived at after discussion by the entire panel.

Rating Scheme for the Strength of the Recommendations

Strength of Recommendation

Strength of Recommendation	Description
Strong	Most patients should receive the intervention.
Conditional	Most patients would benefit from the intervention, though some may not. The pros and cons of the intervention should be assessed taking into account the available evidence and the values and preferences of the patient.
Good Practice	There is a high confidence in the estimates of the effect of the intervention, but

Strength of Recommendation	Description
	there is only indirect evidence that would be challenging to subject to a formalized Grading of Recommendations Assessment, Development and Evaluation (GRADE) evaluation.

Cost Analysis

Resource Considerations

Targeted temperature management (TTM) has considerable implications on workload, equipment needs, and financial resources, and two cost-effectiveness studies have evaluated the economic impact of TTM. One study compared neurologic outcomes in post-arrest therapeutic hypothermia and conventional care. Hypothermia yielded an average gain of 0.66 quality adjusted life years (QALY) at an incremental cost of $31,254. Another research group conducted a second cost-effectiveness analysis comparing cooling blankets, peritoneal lavage, and veno-venous extracorporeal membrane oxygenation to conventional supportive care in out-of-hospital cardiac arrest (OHCA) patients. Lavage produced the highest increase in QALY (2.43) with an incremental cost-effectiveness ratio of $58,329 per QALY when compared to cooling blankets. Both studies concluded that cooling blankets provide improved clinical outcomes with acceptable costs. There is a paucity in the literature evaluating newer temperature modulating devices (TMDs) and their cost-effectiveness.

Several surveys have reported that a lack of treatment protocols, knowledge deficiencies, limited access to dedicated equipment, reimbursement concerns, lack of financial resources, and increased workload are major barriers to TTM implementation. Gel pad surface devices are often considered to be easier to apply and maintain, and all TMDs are considered to be less labor-intensive than conventional cooling methods. Intravascular devices are commonly considered to be more hygienic and to allow for better visualization of the patient.

Method of Guideline Validation

External Peer Review

Internal Peer Review

Description of Method of Guideline Validation

Both internal experts from the Neurocritical Care Society and external stakeholders reviewed the final guideline.

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

- Studies have found that advanced cooling techniques resulted in a faster time to target temperature and were associated with higher likelihood of success in achieving target temperature.
- All non-pharmacologic interventions have been shown to decrease the shiver index and improve overall subjective comfort in healthy volunteers.
- Maintaining serum potassium levels between 3.0 and 3.5 mmol/L during induction and maintenance phases may prevent arrhythmias and reduce the risk of rebound hyperkalemia during rewarming.
- Correcting arterial blood gas (ABG) values for actual body temperatures using either method will result in the most accurate assessment of partial pressure of oxygen and carbon dioxide.
- Early mobilization in the intensive care unit (ICU) decreases length of stay, ventilator days, delirium days, and readmissions. In stroke patients, early mobilization improves functional recovery and cognition.
- In two observational studies of out-of-hospital cardiac arrest (OHCA), a correlation was noted between improved survival and a longer duration of therapy; however, this may be related to the earlier application of targeted temperature management (TTM) post-arrest as opposed to the duration of therapy itself. While studying intracranial pressure (ICP) control in severe traumatic brain injury (TBI) patients, one study found TTM for five days as opposed to two days resulted in significantly improved functional outcomes.
- Two randomized controlled trials (RCTs) and one cohort study examined TTM in patients with fever refractory to conventional therapies such as antipyretics and intermittent cooling blankets. All noted a lower fever burden in the treatment group. One research group managed fever prophylactically in a cohort of severe TBI patients; they observed a lower ICP burden with TTM prophylaxis as compared to historical controls.
- There is strong evidence that creating and following an institutional algorithm for the assessment and treatment of shivering in TTM is an effective strategy to minimize oversedation and avoid paralytics.

Potential Harms

- Targeted temperature management (TTM) patients have more tracheostomies and longer intensive care unit (ICU) length of stay (LOS), but equivalent overall hospital stays.
- Shivering is an anticipated consequence and potentially major adverse effect of TTM.
- Complications of enteral feeding during TTM may include slowed motility, high residuals, aspiration, and poor absorption.
- The influence of temperature management on inflammatory markers could potentially hinder the reliable diagnosis of infection in TTM patients.
- With its considerable effects on physiology, TTM has the potential to impact the accuracy and interpretation of laboratory tests commonly used in neurocritical care.
- The desired inhibition of platelet aggregation with clopidogrel, ticagrelor, or prasugrel may not be as reliable in therapeutic hypothermia (TH) patients, increasing the risk for stent thrombosis.
- The impact of temperature-related coagulopathies is of great concern in TTM. Temperatures below 35 °C are known to affect the coagulation cascade as well as platelet function, which can cause prolonged prothrombin and partial thromboplastin times. As a result, it can be challenging to differentiate injury-induced coagulopathies from those caused by TTM.
- Patients undergoing TTM may be at heightened risk for skin complications due to immobility and the contact of cooling devices with the skin.
- TTM devices and shivering management strategies can be barriers to early mobilization and often limit movement to range of motion exercises, turning, and elevating the head of the bed.
- A randomized controlled trial (RCT) identified a significantly greater incidence of bradycardia, premature ventricular contractions, and couplets during the first 24 hours of TTM; however, these results are of questionable clinical significance. A study identified a 66% higher incidence of deep vein thrombosis (DVT) with hypothermic patients.
- Two studies found a higher incidence of bradycardia during hypothermia for hypoxic-ischemic encephalopathy (HIE) and traumatic brain injury (TBI), respectively.
- Cold saline should be used with caution during cardiac arrest resuscitations.

Qualifying Statements

Qualifying Statements

Qualifying Statements

This guideline is intended for neurocritical care clinicians who have chosen to use targeted temperature management (TTM) in patient care; it is not meant to provide guidance regarding the clinical indications for TTM itself. While there are areas of TTM practice where clear evidence guides strong recommendations, many of the recommendations are conditional, and must be contextualized to individual patient and system needs.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

IOM Domain

Effectiveness

Safety

Identifying Information and Availability

Bibliographic Source(s)

Madden LK, Hill M, May TL, Human T, Guanci MM, Jacobi J, Moreda MV, Badjatia N. The implementation of targeted temperature management: an evidence-based guideline from the Neurocritical Care Society. Neurocrit Care. 2017 Dec;27(3):468-87. [205 references] PubMed

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2017 Dec

Guideline Developer(s)

Neurocritical Care Society - Medical Specialty Society

Source(s) of Funding

Neurocritical Care Society

Guideline Committee

Targeted Temperature Management Guideline Committee

Composition of Group That Authored the Guideline

Committee Members: Lori Kennedy Madden, University of California Davis, Sacramento, CA; Michelle Hill, Riverside Methodist Hospital, Columbus, OH; Teresa L. May, Maine Medical Center, Portland, ME; Theresa Human, Barnes Jewish Hospital, Washington University, Saint Louis, MO; Mary McKenna Guanci, Massachusetts General Hospital, Boston, MA; Judith Jacobi, Indiana University Health Methodist Hospital, Indianapolis, IN; Melissa V. Moreda, Duke Raleigh Hospital, Raleigh, NC; Neeraj Badjatia, University of Maryland, Baltimore, MD

Financial Disclosures/Conflicts of Interest

Disclosures

Madden: none; Hill: honorariums from Bard Medical for speakers bureau; May: none; Human: honorariums from Cumberland Pharmaceuticals for advisory panel; Guanci: honorariums from Bard Medical for speakers bureau; Jacobi: none; Moreda: none; Badjatia: research funding from Bard Medical and Maryland Industry Partnership Program.

Guideline Endorser(s)

American Association of Critical-Care Nurses - Professional Association

American Association of Neuroscience Nurses - Professional Association

Society of Critical Care Medicine - Professional Association

Guideline Status

This is the current release of the guideline.

This guideline meets NGC's 2013 (revised) inclusion criteria.

Guideline Availability

Available from the Neurocritical Care Society Web site .

Availability of Companion Documents

Supplementary material is available from the Springer Web site .

Patient Resources

None available

NGC Status

This NGC summary was completed by ECRI Institute on May 8, 2018. The information was verified by the guideline developer on June 5, 2018.

This NEATS assessment was completed by ECRI Institute on May 1, 2018. The information was verified by the guideline developer on June 5, 2018.

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